COMPUTING IN THE TASMANIAN STATE SERVICE

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This dissertation contains no material which has been accepted for the award of any other degree or graduate diploma in any tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except when due reference is made in the text of the dissertation.

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ABSTRACT

There is no major study available of actual and projected investment in computing by Tasmanian Government sources.

This Dissertation attempts to sketch a picture of the cost centres involved in Tasmanian Government computing investments and to identify trends and projected trends in that investment picture. Chapter 2 provides the historical perspective on the way in which computing has developed in the Tasmanian State Service. Chapter 3 examines in detail actual and proposed investment in computing from 1984/85. The majority of data is taken from the Tasmanian State Service Agencies' EDP Strategic Plans, which are not published.

Chapter 4 examines the administrative controls and management structures which have had an impact on the way in which Agencies have made computing investment decisions. The risks and exposures which these Agencies acknowledge exist, and those of which they appear to be unaware, are examined.

In the final part of this Dissertation some proposals are made to reorganise certain administrative structures which impact on computing resources in the State Service. In addition, based on the trends observed in the investment picture and the risks acknowledged by the managers, certain proposals for staff development are made.

The investment picture revealed from the examination of the unpublished data indicates that around $17.7 million to $19.4 million will be spent on computing activities in the Tasmanian State Service in 1986/87. Over the past three years, investment in computing has been mainly proportioned between capital equipment costs (18-33%), associated recurrent costs (34-14%) and staffing costs (31-40%).

The study demonstrates that the trends in predictions regarding non-specialist users requiring access to computer systems will require significant improvements in staff development, software ergonomics and capacity planning by DP managers as well as policy redirections which appear to be largely unrecognised at present.

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1. INTRODUCTION

In Tasmania the State Government is the major purchaser of computer equipment and is a major user of related service industries. Many companies have set up branch offices in Tasmania purely on the strength of Government contracts. Yet the investment in computing for Government Agencies varies from year to year to such an extent that few companies can afford to rely on that sector.

There is no major study available of actual and projected investment in computing by Tasmanian Government sources. Such projections have been produced for New South Wales and in part for Western Australia. Such a study is believed to be of use to the private sector, educators and to the Government Service as an aid in planning associated resource requirements, administrative structures, policies and practices, and as a tool for use in pre-empting and managing risks associated with the use of computers in strategic areas of Government.

This Dissertation attempts to sketch a picture of the cost centres involved in Tasmanian Government computing investments and to identify trends and projected trends in that investment picture. Chapter 2 provides the historical perspective on the way in which computing has developed in the Tasmanian State Service and leads into Chapter 3 which examines in detail actual and proposed investment in computing from 1984/85. Published budgetary figures will be used, when available, but the majority

of data will be taken from the Tasmanian State Service Agencies' EDP Strategic Plans, which are not published.

The second part of this study will examine in Chapter 4 the administrative controls and management structures which have had an impact on the way in which Agencies have made computing investment decisions. It will also examine the risks and exposures which these Agencies acknowledge exist, and those of which they appear to be unaware.

In the final part of this Dissertation some proposals will be made to reorganise certain administrative structures which impact on computing resources in the State Service. In addition, based on the trends observed in the investment picture and the risk acknowledged by the managers, certain proposals for staff development and management improvement will be made. Finally, some observations will be made on the possible need for redirection of investment away from the DP shop approach to centralised computing in which local processors are bought as an exception to the rule and only when a facilities centre can not provide the required service. Although the suggestion is admittedly not new, it is believed that the evidence provided by this Dissertation provides the first consolidated proof of the requirement for a nodal, linked, compatible approach to government computing which should benefit administrative control, containment of costs, optimisation of support, and ease of expansion when required which the current installed base and communication structures do not directly facilitate.

2. COMPUTING IN THE TASMANIAN STATE SERVICE AN HISTORICAL PERSPECTIVE

2.1 Description of the Tasmanian State Service Concept

In 1978 the Tasmanian Government set up a series of Task Forces under the direction of Sir George Cartland to review Tasmanian Government administration. The six reports of those Task Forces are collectively known as Phase I of the Cartland Report.

Phase II of Cartland's investigations began in March 1979 and concluded in November 1981 with the presentation to the Tasmanian Government of the "second instalment" of the Report of Phase II of the Review of Tasmanian Government Administration. No similar review had been undertaken for some 70 years. (1)

Cartland "attempted to provide a comprehensive programme of fundamental reform" the implementation of which he anticipated "may have to be spread over a year or two because new legislation is involved".

It was not until December 1985 that legislation was proclaimed creating the Tasmanian State Service. The Tasmanian State Service Act (1984) removed the independence of several employing authorities, abolished the Public Service Board and created several new Agencies with central policy advisory roles.

The list of Agencies in the Tasmanian State Service Act is defined as a Schedule to the Act. The concept of the State Service excludes certain State Agencies such as the Hydro-Electric Commission, the Tasmanian Government Insurance Office, the Totalisator Agency Board and the Tasmanian Development Authority. All of these Agencies have significant or increasingly significant computer systems. As much information as can be gleaned from publicly available documents on the computing activities of those Agencies has been included in Chapter 3 of this Dissertation so that a State Agencies perspectiveon computing investment might be obtained, however inadequately. Nevertheless, the bulk of this dissertation is based on the State Service Agencies' information provided to the Government's Computer Policy Advisory Committee.

2.2 A brief history of the use of computers in Tasmanian Government Agencies 1955 - 1980 (2)

The use of computers in Tasmanian Government Service goes back less than a third of a century. The pioneers in the public sector were research officers, engineers and administrators in the Department of Health Services, the Forestry Commission and the Hydro-Electric Commission.

Around 1956, punch card sorting machines were first introduced into the Department of Health Services as part of the Child Health Programme. These Power-Samas were used mainly to sort cards on the basis of immunisation records. They were removed from use in 1969, their operators being transferred to the

Data Preparation Unit of what was to become the Computer Services Branch of the Treasury Department.

The earliest application of computer technology to the Forestry Commission commenced in 1958 when the Commission began to use a Sydney based IBM 650 computer for the analysis of forest management data.

The Hydro-Electric Commission in the early 1960's also joined the trend towards automatic data processing with the introduction of an ICL 1004. This device was a punch card reading machine which could calculate and process figures on punch cards, and was programmed using a plug board. The ICL 1004 was taken out of service in 1969.

It was not until 1966 that serious consideration was given to the use of computer technology for administrative purposes in Tasmanian Government Service.

In this year, a decision was taken to establish an Automated Data Processing Section within the Public Service Commissioner's Department. This section was established to provide a computing service to other Government Agencies.

Having taken the decision to create the ADP Section, the Government entered into an agreement with the then Commonwealth Bureau of Census and Statistics. Under this Agreement, the State committed itself to provide a site for a CDC 3200 computer, and,

in return, received guaranted time on this machine. The Commonwealth Bureau of Census and Statistics also agreed to provide opportunities for State Government employees to be trained as programmers by the Bureau. These arrangements continued from 1966 to 1975.

In 1975 Cabinet set up a Computer Policy Advisory Committee, whose primary function was the establishment of a State Computer Centre under the control of the ADP Section. Soon after the establishment of this Committee, the ADP Section was transferred from the Public Service Commissioner's Department to the Treasury Department and re-named the Computer Services Branch.

The original Computer Policy Advisory Committee had vested in it control over purchases of computing equipment by Public Service Departments.

Because it had been established to oversee the development of a State Computer Centre, the Committee was wedded to a centralised system. From this commitment flowed its attitude not to allow Departments to purchase any equipment unless those Departments could demonstrate exceptional circumstances.

In the context of the uncertainties of the mid 1970's in relation to the future of computer technology, a policy of computer management based on tight centralised control was perhaps understandable.

In hindsight, however, this policy hindered rather than helped the introduction of contemporary technological advances in the public sector in this State. Problems due to the delay in the introduction of new technology were exacerbated because of serious delays experienced in the establishment of the State Computer Centre.

These delays were certainly not the fault of the Computer Policy Committee or of the Computer Services Branch. Much of the responsibility for the time lag between the decision to have a State Computer Centre and the realisation of that objective must be shifted to continuing uncertainty on the part of the Government as to the most appropriate course to be followed.

A Request for Information was issued in March 1977 to nine manufacturers who provided estimates of the cost of a centralised mainframe facility. The philosophy was "not one of 'total centralisation' where computer usage is so rigidly controlled that user Departments have no flexibility at all" but one in which "the central 'host' processor is the core of a distributed processing network providing support where it is needed but not so rigidly that flexibility is destroyed." **(3)** The intention was for the establishment of in-house processors which could access central databases of common information such as lands and electoral data.

The original intention was that the Centre should be built in Gladstone Street. The Parliamentary Standing Committee on

Public Works recommended the need for a Centre **(4)** but drew attention to some environmental evidence that needed consideration in the preparation of working papers and tender documents. As a result, the Government gave consideration to another site in the same street and referred it to the Committee, but that reference was in turn superseded by the one to investigate the Harrington/Melville Street site. The estimated cost of the building was $2,435,500. **(4)**

Notwithstanding the cause, however, the fact remained that it was almost six years before the Tasmanian Government acquired its first large main frame computer.

A number of Departments with access to non-State controlled funds (for example, the Education Department) were able, during these intervening years, to develop their own computer systems outside the control of the old Computer Policy Committee. Other Agencies (for example the Transport Department) were able to convince Cabinet that there were exceptional circumstances with respect to their activities, and were able to purchase their own computing equipment.

During the intervening period, the State purchased a DEC PDP11/70 computer to do some of the jobs which the Australian Bureau of Statistics computer could not do (or could not do cheaply).

In early 1980 the State Government made a decision to purchase a (Sperry) Univac 1100/61 computer for the Treasury. This decision marked the achievement of the major goal of the old Computer Policy Committee.

Since 1980 the successive versions of the Committee have allowed developments to go ahead with little hindrance if they were to use the Centre. However, increasing numbers of special cases have come forward so that a range of equipment has been purchased for a number of Agencies which use the Centre to a greater or lesser degree.

Since 1984, with the introduction of the State Service concept, the computing resources of a number of Agencies which were previously largely autonomous have come under the scrutiny of the CPAC. In many cases they are unique, if not incompatible with the majority of State Computer Centre users' equipment.

The following Chapter analyses investments in computing and trends in investment in computing by State Service Agencies.

3. ANALYSIS OF THE INVESTMENT IN COMPUTING IN THE STATE SERVICE

3.1 Variation between published and unpublished sources of information.

Some Agencies include in the Consolidated Revenue Bill summary a "B" item called "Costs of Data Processing" or similar. That item usually only covers recurrent costs, but may include the cost of capital purchases for that year. It generally does not include staffing costs and EDP specialist staff are usually included under the general "A" item, "Staff" or similar.

In recent years, particularly since 1984/85, an increasing proportion of purchases is being made from Loan Funds. In 1984/85 Treasury collated all bids from Consolidated Revenue-funded Agencies for computer purchases and put an appropriation line item for "Office Machines and Equipment" in the Loan Funds Bill. In the 1985/86 Bill it is listed as "Payment to the Trust Fund for the purchase of computer and other equipment".

In 1984/85 around two-thirds of that amount was earmarked for computer terminal purchases, including personal computers, and that allocation also covered upgrades to mini-computers as well as systems software. Application sofware (however defined) is not

purchased from that amount, and major purchases require separate Loan Fund allocations or are leased in various ways.

The Auditor-General's Annual Report to Parliament contains more detail on systems or purchases which have come to his notice for one reason or another. The Annual Reports of the Agencies themselves sometimes go into more detail about expenditure on computing, but more often they do not. Finally, press reports of varying accuracy also give some information.

Table 1 summarises, from the Tasmanian Government's 1985/86 Budget Bills and associated papers **(5, 6, 7)** the line items which, to a greater or lesser degree, obviously relate to computing expenses. The differences between the published Budget figures for the cost of computing and the figures provided by Agencies as part of their annual EDP Strategic Plans are, in many cases, very significant.

The EDP Strategic Plans used for the comparative analysis which forms the following section and the rest of this Chapter are listed in Table 2. In addition to, or in place of, some Agencies' Plans, I have also used major submissions, when necessary. If an Agency has not submitted a Plan for 1984/85 or later, the early Plan (if available) has been used, with no percentage increase.

TABLE 1

Summary of 1985/86 Tasmanian Government Budget information on appropriations for computing

Source of data : see references 5 - 7.

1985/86 Consolidated Revenue Fund
Departmental Revenue

AGENCY	ACTUAL 1984/85	ESTIMATED 1985/86
Treasury - Computer Serv Branch	1,922,165	2,125,000
1985/86 Consolidated Revenue Fund		
Departmental Expenditure		
Items listed as "Costs of Automatic Data Processing" or similar		
Tasmanian Development Authority	52,496	65,000
Audit Department	17,838	28,000
Treasury - Superannuation Branch	31,208	28,000
Treasury - Taxation Branch	178,929	375,000
Department of Tourism	0	700,000
State Library of Tasmania	174,913	175,000
Department of Agriculture	0	145,000
Department of Health Services	79,125	177,000
Supply and Tender Department	110,002	54,600
Department of Sea Fisheries	0	80,000
Department of Public Admin	113,691	100,000
Other (fairly obvious) computer-related items		
Treasury - expenses of operation of the Govt. Paystat Payroll System	214,122	209,000
Treasury - costs associated with the development and implementation of a Computerised Financial System	265,444	100,000
Treasury - Computer Services Branch		
Including salaries	2,466,517	3,220,000
Excluding salaries	1,208,466	1,875,000
Lands Department - costs associated with Valtax Computer System	247,025	250,000
Department of Construction - computer services for architectural specifications	107,675	150,000
Department of Public Administration - expenses of the Computer Policy Committee	9,943	10,000
Total revenue from computing:	**1,922,165**	**2,125,000**
Total CR Fund expenditure on computing:	**4,168,928**	**6,038,600**

(TABLE 1 CONT.)

Total CRF Revenue:	**953,208,663**	**1,021,635,149**
Total CRF expenditure:	**952,922,305**	**1,036,397,892**
1985/86 Loan Fund Expenditure		
Treasury - Payment to the Trust Fund for the purchase of computer and other equipment	500,000	2,500,000
1985/86 Works Programme Expenditure		
State Library - computer eqt.	199,313	0
Department of Tourism - Computerised Reservation System	755,185	0
Transport Department - computer equipment	373,622	350,000
Treasury - Computerised Financial System	3,392,038	2,500,000
Loan Fund Building Construction Works		
Department of Construction for the Computer Room extension at the State Computer Centre - Stage 1	0	164,000
Total works funds:	**510,812,683**	**599,357,352**
Total works/loan exp.::	**510,813,000**	**599,357,000**
Total works expenditure on computing:	**5,220,158**	**5,514,000**

SUMMARY OF BUDGET PAPER INFORMATION

	ACTUAL 1984/85	**ESTIMATED 1985/86**
Total Govt."Revenue":	**1,464,021,346**	**1,620,992,501**
Total Computing Revenue:	**1,922,165**	**2,125,000**
Percentage Rev. from compt .:	**0.1313%**	**0.1311%**
Total Govt Expend.:	**1,463,735,305**	**1,635,754,892**
Total Computing Expenditure :	**9,389,086**	**11,552,600**
Percentage Expenditure on computing:	**0.6414%**	**0.7063%**

TABLE 2

Unpublished Sources of information used in this dissertation

ADMINISTRATIVE UNIT	EDP STRATEGIC PLAN	MAJOR CPAC SUBMISSION
Department of Agriculture	1985/86	
Audit Department	1986/87	
Department for Community Welfare	1985-87	
Department of Construction	1986/87	Oct 1985
Consumer Affairs Council	1984/85	
Education Department	1983-85	TAFE 1985
Egg Marketing Board		
Electoral Department		
Department of Employment and Training		
Department of the Environment	1986/87	
Forestry Department	1985/86	
Government Printing Office		1985
Department of Health Services	1984-88	
Herd Improvement Board	1984	
Hobart Regional Water Board		
Hospitals (See D.H.S.)		
Housing Department	1985/86	
Inland Fisheries Commission		
Department of Labour and Industry		
Lands Department	1984/85	June 1985
	1985/86	
	1986/87	
Law Department	1984	
	1986/87	
Licensing Board	1985/86	
Department of Main Roads	1983/84	Oct 1985
Mental Health Services Commission		
Metropolitan Transport Trust	1984/85	
	1985/86	
Mines Department	1985/86	
	1986/87	
Motor Accidents Insurance Board		
National Parks and Wildlife Service	1985	
Police Department		1984/85
Dept. of the Premier and Cabinet	1984/85	
	1985/86	
Department of Public Administration	1985/86	
Public Trust Office	1985/86	
Rivers and Water Supply Commission	1984/85	
Schools Board	1984-86	
Department of Sea Fisheries		1985 TFDA
Department of Sport and Recreation	1986/87	
State Library Department	1984/85	
	1985/86	
	1986/87	

(TABLE 2 CONT.)

Supply and Tender Department	1983/84
	1985/86
	1986/87
Supreme Court and Sheriff's Office	
Tasmania Fire Service	
Tasmanian Ambulance Service	
Tasmanian Botanical Gardens	
Tasmanian Dairy Industry Authority	1984/85
Tasmanian Gaming Commission	1986/87
Tasmanian Grain Elevators' Board	
Tasmanian Industrial Commission	1986/87
Tasmanian Museum and Art Gallery	
Tasmanian Racing Directorate	1986/87
Department of Tourism	1985
Transport Department	1984/85
	1986/87
Treasury - various separate units	1984/85
(not complete for some units)	1986/87

In Tables 3 and 4, a comparison of EDP costs is made. In the first column, the costs as listed in Table 1 are included. They are the published costs of computing for that Agency, as approved by Parliament.

The second column is the total cost of EDP as estimated by the Agency and advised to CPAC in the Agency's EDP Strategic Plan. In an attempt to fairly compare the two figures, I have used only the most recent Plan. Most were written close to the end of the 1984/85 years or in subsequent years and so should contain a relatively accurate actual cost for 1984/85 EDP expenditure.

TABLE 3

Comparison of published and unpublished reports of 1984/85 actual costs of EDP in Tasmanian State Service Agencies.

Sources: References 5-7 and the unpublished sources listed in Table 2.

Administrative Units included in this Table are **only** those listed in Table 2.

PUBLISHED ACTUAL COSTS	UNPUBLISHED TOTAL COSTS	DIFFERENCE $	%
$9,336,590	$7,617,282 plus staff development costs of $180,988	1,535,320	16.48%
	$7,798,270	1,865,320	

A major contributor to the discrepancy of -$1,865,320 was Treasury's Head Office and Budget and Finance EDP Strategic Plans. They were unable at that time to calculate expenditure on EDP for the Computerised Financial System and Paystat, in particular. Consequently, the difference between published and unpublished figures for systems excluding CFS and Paystat was at least - $2,333,284.

A second major contributor to this discrepancy was Tourism's inability to calculate the cost of their Computerised Reservation System. Consequently, the $755,185 published CRS figure was not included in their EDP Strategic Plan.

If those two known disabilities are removed and no account is taken of that part of Treasury and of Tourism, the difference between published and unpublished figures for this selected group of Agencies breaks down as shown in Table 4.

Table 4

Differences between published and unpublished figures for 1984/85 computing costs for Agencies named in 1985/86 Budget information as having funds appropriated for computing.

Source of data: References 5-7 and those sources listed in Table 2, excluding part of Treasury and all of Tourism (see explanation above).

PUBLISHED ACTUAL COSTS	UNPUBLISHED TOTAL COSTS	DIFFERENCE $	%
$4,709,801	$7,798,270	$3,088,469	65.58%

Conclusions

The difference between figures published in the Budget papers and the real cost of computing in Tasmanian Government administration is estimated to be some 66% for Agencies whose line budgets actually list computing costs. However, it is considered that even this figure is very conservative.

When account is taken of those Agencies whose line budgets do not separate some component of computing costs for publication, the difference is even more marked.

As Table 5 shows, at least another 18 Agencies whose EDP Strategic Plans have been received by the CPAC did not list computing costs in the Budget Papers referred to above **(5-7)**. Taking these figures into account, the conclusion can be drawn that hidden costs of at least **134%** are associated with computing in the State Service. I say at least, because that Table excludes a number of Agencies (at this stage). All those excluded (to date) did not appear in the publications with which the Plans have

been compared. Therefore, any costs listed in their Plans must increase this figure of 134%.

Table 5

Differences between published and unpublished figures for 1984/85 computing costs.

Source of data: References 5-7 and those sources listed in Table 2.

Number of Administrative Units increased from Table 4 by including all other Units listed in Table 2 but not listed in Table 1.

NO. OF ADMIN. UNITS	PUBLISHED ACTUAL COSTS	UNPUBLISHED TOTAL COSTS	DIFFERENCE	
11	$4,209,801	$7,234,89	$3,025,094	71.86%
18	$ 0	$2,614,662	$2,614,662	100%
29	$4,209,801	$9,849,557	$5,639,756	133.97%

Explanation

There are a number of factors which contribute to the hidden cost of computing in the Tasmanian State Service.

Firstly, the line budget system necessitates spreading associated costs among a number of quite different items.

Secondly, the description of line items ecnourages or necessitates hiding some, at times, very high computing costs amongst generics such as "Communications Equipment" for Police, "Administration Costs, including Planning, Design, Documentation and Supervision" for Main Roads, "Equipment" for Education, and so on.

Thirdly, the structure of the Computer Policy Advisory Committee's **(8)** EDP Strategic Plans Guidelines forces Agencies to itemise **all** computing-related costs, including:

- EDP Specialist Salaries
- In-house Computing Equipment
- Software
- Data Communications
- External Computer Usage (including COM)
- Consultants and Contract Staff
- Other Operational Costs

In addition, different Agencies interpret the definitions of EDP costs differently. Some will not include word processing costs. Some regard technical staff who program computers for most of their day as EDP staff, whilst others do not. Some use funds from Commonwealth or trading sources which are attached to a particular Trust or Trading Fund and not shown separately.

Although the Trust Fund allocation for computing equipment listed against Treasury in the Budget Papers might be discounted against that Agency, it is absorbed into the Plans of the recipient Administrative Units. Consequently, the quantum Service-wide figures should be relatively accurate.

In the next sections, I intend to analyse the data provided to CPAC on all of these categories of computing costs.

Footnote

It is interesting to note that, on the published figures, only $9,943 out of $9,336,590, or 0.106% of computing expenditure

in 1984/85 was published as having been spent on Service-wide policy development, coordination and planning for computing. Adding the **$2,614,662** from the other 18 Agencies' EDP expenditure identified in Table 5, this reduces to 0.083% of computing expenditure.

3.2 COST OF INSTALLED EQUIPMENT BASE

3.2.1 Caveat

Whilst every effort has been made to obtain accurate information, in many cases those records do not seem to be available due to the age of the equipment or due to the fact that equipment purchased by one Agency has been transferred to a new, combined or split, Agency and the records are not able to be easily found.

The data on purchases made in the past three years is probably the most accurate, but even so it is believed, on the basis of experience, that the figures are incomplete.

The following major systems have not been included in the Tables because the Agencies have not yet provided the required data, including cost and year of installation:

- Tourism (Computerised Reservations System)
- Education purchases for Elizabeth Computer Centre
- Treasury (Computerised Financial System).

3.2.2 Year 1 and following equipment costs and description of the type of equipment still in use

Most computer purchases have their peak cost period in the first year as the basic or central configurations are purchased then. Add-on costs of peripheral equipment purchased in later years have been treated in this analysis as (later) Year 1 costs. Maintenance costs after Year 1 are included in Table 7 as Recurrent costs. If a unit is leased, the Year 1 cost is included in Table 6 .

Table 6 shows the Year 1 costs of Tasmanian State Service computer equipment known to be still in use, broken down by calendar year of purchase. Where exact dates of purchase are not known, the earlier of the financial year couplet has been used (i.e. for 1984/85 purchases, the year has been treated as a 1984 purchase because appropriation of the money for that purpose would generally have been made in the earlier year.

It should be noted that in many cases the cost of older equipment (and in some cases equipment purchased as recently as 1985) has not been (able to be) included in particular Agencies' returns. Consequently, the figures are known to be underestimated.

Table 6

Year 1 computer equipment costs
(Only those units known to be still in use)

Source of data : See Table 2

YEAR PURCHASED	COST OF EQUIPMENT IN YEAR OF PURCHASE	
1974	0	(i.e. unknown cost)
1975	76442	
1976	27057	
1977	21662	
1978	134000	
1979	71312	
1980	300795	
1981	216202	
1982	231297	
1983	420280	
1984	1936846	
1985	2317951	
1986	134051	
1979-85	1355000	(i.e. unknown years/costs)
TOTAL	7242895	

Only one unit purchased in 1974 is known to be still in operation. Similarly, only one unit purchased in 1975 is known still to be in operation. Both are Hewlett-Packard technical monitoring devices.

Many items purchased in 1979 are still in use, but most will be replaced in the 1986/87 financial year as a stage in major integrated redevelopments or as a re-equipping exercise.

Similarly, it is expected that at least half of the 1980 purchases will be replaced in 1986/87 or the following year if they have not already been in early 1986.

The 1981 units include a high number of portable computers and other microcomputers from a variety of manufacturers. Within the next two years most are likely to be required to be replaced as their technology, mainly 64K Z80 chips and low floppy disk storage capacity, is grossly outdated in comparison with currently-available market offerings.

The bulk of the 1982 purchases is Sperry terminal equipment which is still suitable for many applications. About ten Z80 microcomputers make up most of the remainder and will need to be replaced.

The 1983 purchases are mostly Sperry terminal equipment, Adler and Olivetti word processors, and a variety of microcomputers. The lifespan of most will depend on the type of use that they have had.

In 1984 two major Prime mini-computer purchases were made - one for the State Library and one for Forestry. In the same year an integrated system based on ICL equipment for the Supply and Tender Department was begun and a major upgrade of the Sperry mainframe at the State Computer Centre occurred. Also, the Transport Department upgraded its Prime systems. Most were outright purchases, although the ICL and Sperry systems are leased. These acquisitions make up the bulk of the 1984 costs. The rest include a high number of Sperry terminal purchases and Olivetti word processors, plus IBM PCs., followed by a miscellany of microcomputer brands.

In 1985 the Rivers and Water Supply Commission purchased a Dual mini-computer system, and the Mines Department purchased a Perkin-Elmer mini. The Government Printer purchased a Data-General-based Penta phototypsesetting system, Transport again upgraded, and a lease for the ICL-based Ferrypars booking system plus some expenditure on Tourism's ICL system for computerised reservations occurred. Most minor purchases (of which there were a considerable number) were of Sperry or ICL terminal or WP equipment, Olivetti PCs and a few other types of word processors.

In 1986 major purchases to date include the Lands Department's Wild Mapping and Survey system.

In summary, replacement of the equipment purchased between 1974 and 1982 would seem highly likely to be necessary in the next two years as the technology has advanced so much since they were purchased.

It is interesting to note that a lot of line items against which a Year 1 cost was shown do not have recurrent costs listed in the forms returned by the Agencies. One can deduce from that observation that either such equipment does not receive preventative maintenance, it is repaired on a labour, time and materials basis, or Agencies do not keep records of recurrent costs. Most Sperry equipment is maintained by the State Computer Centre, when necessary, (if purchased through them).

The majority of line item recurrent costs are for maintenance. However, some significant leasing costs are included in this figure yet they represent only a handful of line items. Leasing is increasingly being regarded as an attractive alternative to purchasing which was the previously-preferred option. The most-quoted reason is the increasing scarcity of capital funds for major purchases. Very few pieces of equipment are rented.

Table 7 shows the cumulative costs, where known, of equipment purchased in the years 1974-1985 and still in use.

Table 7
Estimates of cumulative costs of equipment purchases 1974-1985 and still in use

Source of data : See Table 2 - Note - costs are not known, in many cases, therefore these figures are likely to be underestimated.

YEAR PURCHASED	YEAR 1 COSTS	YEAR 2 RECURRENT	TOTAL CUMULATIVE COSTS
1974	0	0	0
1975	76442	9244	178126
1976	27057	3216	59217
1977	21662	1862	38420
1978	134000	12760	236080
1979	71312	21100	219012
1980	300795	47213	584073
1981	216202	176054	1096472
1982	231297	16802	298505
1983	420280	37217	531931
1984	1936846	841820	3620486
1985	2317951	148399	2466350
1986	134051	3577	134051
1979-1985	1355000	90000	1455000
TOTAL	7242895	1409264	10817723

= 19.46%

3.2.3 Projected equipment purchase and recurrent costs

Table 8 outlines the expectations of the Agencies for the purchase of computer equipment in 1986/87 and following (if known).

Clearly, these figures must be treated with caution. It is already apparent that less than one-fifth of those expectations will be met unless Agencies are able to re-allocate operating funds to meet those costs.

Note: The recurrent costs in many cases INCLUDE recurrent costs incurred as a result of previous years' purchases. They are NOT exclusively additional recurrent costs and clearly that level of recurrent expenditure will not be needed if the additional capital costs are not provided, and if the approval to develop those systems is not forthcoming.

Table 8
Projections of capital and recurrent costs
Source: See Table 2

1986/87 Capital	1986/87 Recurrent	1987/88 Capital	1987/88 Recurrent
5767840	2540626	1176000	889439

Leasing or purchase costs of the Tourism Centralised Reservations System, Treasury Computerised Financial System, and Education's Elizabeth Computer Centre are likely to greatly increase these figures.

3.3 COST OF SOFTWARE

3.3.1 Purchase or development costs

It is not possible from the sources used for this dissertation to accurately establish the costs of the purchase or development of software currently in use in Tasmanian State Service Agencies. The Government's Computer Policy Advisory Committee's EDP Strategic Plan Guidelines do not require the software inventory forms to list the cost of the software. In most Agencies no record of the time spent on developing particular pieces of software is kept.

3.3.2 Maintenance and other ongoing costs

Similarly, it is not possible from the available information to determine what costs are incurred in maintenance, licensing and leasing of individual pieces of software.

3.3.3 Projected expenditure on software

Agencies are required, however, to tabulate their expected expenditure for the current and next two years on system software and applications packages. The nature of that expenditure is not broken down.

The figures shown in Table 9 reflect only part of the true cost of software development and maintenance.

The so-called fourth-generation language (4GL) MAPPER is used by a high number of Agencies to develop applications on the State Computer Centre's Sperry system. If that development (and redevelopment) is carried out by clerical staff or other non-EDP staff, it is unlikely that the cost will ever be able to be accurately estimated.

However, the annual cost of programmers' and analysts' salaries (see Chapter 5) is one cost which can be taken into account in considering the overt software costs listed below.

Table 9

Cost of software in Tasmanian State Service Agencies 1984-1987

Source of data : See Table 2

	1984/85	1985/86	1986/87
Applications software	137400	373900	472000
Systems software	257800	265200	339200
TOTAL	395200	639100	811200

Again, the major software costs associated with the following systems need to be added:

Computerised Financial System

Computerised Reservation System

Education (ECC) after 1984/85.

Notwithstanding the fact that the picture is not complete, a trend of increases approaching 50% per annum in software costs appears to be occurring.

Most of the increases are attributable to major systems for which applications software packages are being purchased and with which are associated maintenance costs.

Some examination of the possibility of multi-site licences for commonly-used personal computer software has occurred but, so far, not many companies have been receptive to the few approaches made by Agencies. Clearly, there is potential for an indepth examination of the savings to be made in negotiating these types of deals now that so many personal computers are being purchased across the Service.

3.4 EDP STAFF RESOURCE COSTS

3.4.1 Structure of EDP staff salaries

Approximately **half** of the Tasmanian State Service Agencies have staff which the Agencies designated as EDP, ADP, DP or Information Management staff. Most have keyboard staff who use word processors. Whether or not Agencies recognise word processors as computer equipment varies markedly and consequently there is a variation in whether or not those staff are included in the figures listed below.

There is no single industrial award for EDP staff. Most are classified under the Administrative and Clerical Officers' Award of the Tasmanian Industrial Commission, or under technical officers' awards.

There is a progression scheme for computer programmers who can, under the Administrative and Clerical Officers' Award, progress more quickly if they exhibit certain designated expertise or if they can demonstrate years of experience.

The progression scheme was introduced when there was no Information Science training available in Tasmania and selected officers were sent to Canberra for intensive training. The scheme is not really appropriate now and recent moves to obtain a special DP staff award have occurred. However, as the barriers between DP and other staff blur with easier-to-use system development packages it is debatable whether or not that separate award is needed.

The numbers of staff listed by the Agencies in their EDP Strategic Plans as specialist EDP staff are shown in Table 10 below. It is not possible to break this data down by industrial award (or presumed award) and level as the general description or titles given are not necessarily related to industrial awards.

Table 10

Predicted numbers of EDP specialist staff

Source : See Table 2.

YEAR	PREDICTED NUMBERS
1984/85	186.85
1985/86	194.16
1986/87	221.70
1987/88	224.20
1988/89	225.20

This picture indicates an expectation of no real growth in EDP positions over the current and next two years. However, certain positions are expected to be abolished whilst some new ones are expected to be created, so recruitment will be likely to continue, albeit at an extremely low level.

3.4.2 Projected expenditure on EDP staff salaries

Agencies are required to tabulate projected expenditure on specialist EDP salaries for the current and next two years as part of the financial summary contained in their EDP Strategic Plans. The result of those projections is summarised in Table 11 below. Where Agencies have not projected those figures, the current year's figures have been included in the summary of the next two years for the purpose of this dissertation, unless known to be likely to decrease.

Table 11

Specialist EDP staff salaries - estimated expenditure

Source of data: See Table 2

YEAR	ESTIMATED EXPENDITURE
1984/85	3,255,791
1985/86	5,132,935
1986/87	5,875,474

Obviously, the investment in EDP Specialist staff is significant. It is debatable in many cases, though, whether in other organisations many of them would be regarded as specialist staff but rather just as staff employed to do typing or clerical work or technical work and, as part of that work, they just happen to use a computer. The Computer Policy Advisory Committee's EDP Strategic Plan Guidelines do not closely define the term "EDP Specialist Staff".

Table 12 shows a breakdown of EDP Specialist staffing costs by category of staff.

Table 12

Specialist EDP staffing costs by category of staff - estimates only

Source of data: See Table 2

($000)

TYPE OF EDP STAFF	84/85	85/86	86/87
Management	233	573	727
Analysts	245	417	446
Analyst/Programmers	752	988	978
Programmers	558	746	1235
Operators	270	563	603
Data Preparation	420	457	597
Other (mainly clerks)	486	641	695
TOTAL	2964	4385	5281

(Education's ECC costs and Department of Main Roads costs have been carried across for this table)

Notwithstanding the discrepancy between Tables 11 and 12, which is partly attributable to incorrect summing up by Agencies, Table 12 demonstrates a fairly clear pattern of expenditure. Between 8% and 15% (increasing) of salary expenditure is on EDP management, between 8% and 10% on straight analysis staff, between 20% and 25% on analyst/programmers, between 20% and 22% on programmers, between 9% and 12% on operators, between 10.5% and 14% on data preparation staff, and between 16% and 11 % on other staff.

Table 12 shows that around half or more of the EDP salary costs are attributable to analyst/programming or similar staff, but there are numerous other niches for computer specialists in the State Service.

Several Agencies with well-developed reliance on computing systems have no-one in charge of computing as such. In some cases this reflects a high degree of confidence in their analysis or programming staff. In others it reflects a lack of acknowledgement of the strategic importance to the Agency of those computing systems. In two notable cases it reflects an unhealthy reliance on one or two individuals with special current interest in the system. In others it is the result of reliance on the supplying company to manage the resources for the Agency.

3.4.3 Use of consultants and contract staff

Increasingly, Tasmanian State Service Agencies are using contract staff and consultants for special projects or development phases of computer systems. The EDP Strategic Plans' financial summaries are supposed to contain current year and next two year projected costs for these two categories of human resource investment.

Where no costs have been listed in any particular year no estimate based on current year costs has been included in the following discussion as these are by their nature fixed term appointments rather than ongoing costs (or they should be).

Of 38 Administrative Units whose EDP Strategic Plans and submissions were examined, 17 indicated no use of consultants was intended (or had been made) during the three-year period covered by their Plans. The other 21 used or intended to use consultants as shown in Table 13.

Table 13

Use of EDP consultants

Source: See Table 2.

($000)

TYPE OF CONSULTANCY	84/85	85/86	86/87	87/88
A..Private sector consultants				
Management	172	98	50	0
Systems Design	17	10	10	0
Programming	175	26	25	0.5
Other	0	0	0	0
TOTAL	364	134	85	0.5

(TABLE 13 CONT.)

B. Public sector consultants

Management	0	0.5	0	0
Systems Design	0	0	45	15
Programming	144	305	275	177
Other	0	10	10	10
TOTAL	144	315.5	330	202
TOTAL:	**508**	**449.5**	**415**	**202.5**

Programming staff possibly underestimated by known consultancies for Rivers and Water Supply Commission and some others.

For those Agencies listed in Table 2, the average expenditure on EDP consultants and contract staff seems to be of the order of half a million dollars per annum.

Bearing in mind that these figures are only reflecting about half of the State Service EDP Strategic Plans, omitting several large systems, the pattern seems to be an increasing use of public sector consultancy services and less use of the private sector.

The major reason for this trend is the growth and improvement of the State Computer Centre's range of consultant services.

The use of public sector consultants has several advantages including the fact that often it is cheaper, sometimes salaries will be better used as "idle" time is redeployed, and often the consultants have worked in other Agencies or the particular Centre for some years and know the Service's potential interactions and can therefore preempt certain contingencies of which private sector people may not be aware.

However, the increasing use of public sector consultants may, in some cases, prove to be incestuous and new ideas and training may not thereby be made available to the client Agency.

That problem may be partly countered if the trend continues for Agencies to prefer the use of private sector consultants for management and half the system design work, as seems to be indicated by Table 13.

3.5 STAFF DEVELOPMENT

3.5.1 Background

The Cartland Report **(1)** emphasised the need for improvement of Tasmanian Government employees' skills. Even before that, the Public Service Board had established a Staff Development Division to set up and facilitate courses to improve the managerial and essential skills of the Service. Section E5 of Cartland's Report detailed an even more comprehensive list of requirements to be met before a full programme of essential training and development offerings would be available.

In recent years the need for training in computing skills has been increasingly recognised and the number of courses offered by the Public Service Board and, since December 1985, the Department of Public Administration, which relate to the use of computers has steadily grown.

Agencies have, in many cases, taken the initiative and hired courses in video format, or hired trainers to come into a particular Agency for a specific training purpose.

The State Computer Centre regularly advises Agencies of courses which it is holding or paying to be held for its staff and to which others may come (on payment of the requisite fee).

Before the establishment of courses in computing at the University of Tasmania the Government paid, through scholarships, selected staff members to go to Canberra to undergo training in programming. Most of those graduates were trained to staff the State Computer Centre.

With the availablity of courses at the University, the TSIT and Technical Colleges, more staff are now enrolling in long-term formal courses leading to qualifications in information science, computer programming, word processing, and so on. For those courses study leave is available, at the discretion of the Head of Agency, to attend lectures and to prepare for examinations.

However, the majority of training and development in computing skills is being provided by short courses in-house either by the Agency itself or by the vendor of the Agency's computer systems or in another Agency. The range of requirements and resource allocations is outlined in Section 3.5.4. Section 3.5.3 partly explains the need for such a variety and number of

short courses. With the increasing ubiquity of computers in the State Service a concomitant variety of employees will require reskilling.

3.5.2 Estimates of the cost of training and staff development in computing skills

Table 14 summarises the training and development cost estimates provided in their most recent EDP Strategic Plan by those Agencies listed in Table 2.

Of the 36 Administrative Units for which returns on this topic were made, seven had no, or no identifiable training plans.

Of the remaining 29, four could not cost their proposed training, yet had listed numerous courses and provided staff-day figures per course.

The details in Table 14, therefore, relate to 25 Agencies who were able to estimate requirements **and to** cost them.

The largest spender is, in most years, the State Computer Centre, peaking at $65,000 in 1986/87 estimates. However, in that year the Department of Tourism heads the list at $68,250. They, like most Agencies, show significantly higher figures in key years of their systems implementation when the highest number of staff will require concurrent training.

Table 14

Staff development costs related to EDP and WP training

Source : See Table 2

YEAR	ESTIMATED COSTS
1984/85	188,988
1985/86	140,790
1986/87	223,330
1987/88	140,960
[1988/89]	[98,400] incomplete

In interpreting these figures, care must be taken as it is possible that some double-counting has taken place because the State Computer Centre's costs may be partly recharged to any Agencies whose staff attend the SCC's courses.

It should also be noted that, in most cases, only the overt costs of these courses have been listed. It is highly unusual for participants' time to also be costed.

Further, these costs do not include the Department of Public Administration Personnel Development Branch's Programme costs in relation to EDP courses.

In an attempt to indicate the proportion of EDP expenditure per annum estimated to be required for EDP training, one can take the figure listed in Tables 3 and 4 as the claimed cost of computing for 1984/85 (i.e. $7,617,282) and add to it the 1984/85 staff development cost ($180,988) then calculate that about 2.3% of Tasmanian State Service EDP-related expenditure is spent on the overt costs of staff development.

3.5.3 Non-EDP staff usage of computing systems

Table 15 attempts to show the predicted usage patterns of non-EDP staff who require access to State Service computing systems.

The high proportion of casual use (less than one hour per day) has many implications for staff development and for software design. If people use computer systems infrequently, they clearly will require systems that are very easy to manipulate, otherwise a high level of skills will be required to be developed and maintained by all of those expected users. Obviously, it is more cost-effective to design the systems properly than to invest and continually reinvest in reskilling those users. The need to prevent and control RSI is also indicated in Table 15 in that around 25% and 30% of users are expected to use the computer systems for between 4 and 7 hours per day.

TABLE 15

Expected numbers of non-EDP staff and others requiring access to State Service computer systems for x hours per day

Source of data: See Table 2

YEAR ENDED 30/6	1985	1986	1987	1988
HOURS				
Less than 1	172	363	404	593
1 <2	85	127	136	134
2 <3	34	77	97	200
3 <4	19	62	85	73
4 <5	16	94	99	131
5 <6	27	55	61	55
6 <7	37	54	65	59
TOTAL	390	832	947	1245

The most dramatic expected increase in number of users is in those requiring access to systems for less than one hour per day. An increase of 421 users or of 245% over the 1984/85 figure is expected by 1987/88. This category of user is expected to increase from 44% to 48% of the total user population over this period.

A shift in emphasis is expected to occur in the 1-3 hours per day slot. Whereas in 1984/85 22% of total users appear in the 1-2 hours category, by 1987/88 this has dropped to 11%, and the 2-3 hours slot has increased from 9% to 16%.

The 2-3 hours slot represents a major proportionate change in that a 488% increase in numbers of users is expected in this time slot over the four year period 1984/85-1987/88. A 719% increase in numbers is expected in the 4-5 hours time slot.

In terms of computer access hours per day, Table 15 demonstrates an expectation of 1021 hours in 1984/85, 2274 hours or a 122.7% increase in 1985/86, 2623 hours or 15.4% increase in 1986/87, and 3151 hours or 20.1% increase in 1987/88.

If the 15-20% usage increase by non-EDP staff continues, then investment in new systems and upgrades to existing systems will probably be required far earlier than is currently being predicted (compare with Table 8).

This increase in expected usage will have an impact on all related cost centres, including software, data communications, consumables, furniture and other associated costs.

Indeed, since first drafting this Dissertation, three major system upgrades have been submitted to the Computer Policy Advisory Committee. At least one of them was, as far as one can tell, relatively unforeseen and the other two earlier than originally expected.

3.5.4 Analysis of the types of courses required

Due to the miscellany of titles, descriptions and names contained in the information provided by Agencies, I have classified that data by type of course and by providor as shown in the following tables.

Table 16 summarises the expected **cost** of EDP-related training by broad category of training broken down by year of expenditure.

Table 17 summarises the expected **number of trainee days** by broad category of training broken down by year of expenditure.

Table 18 summarises the expected cost of EDP-related training by broad category of **trainer** broken down by year of expenditure.

Table 19 summarises the expected number of trainee days by broad category of **trainer** broken down by year of expenditure.

Table 16

Expected cost of EDP-related training by broad category of training

Source of data : See Table 2

CATEGORY	84/85	85/86	86/87	87/88	88/89
AP	68230	42960	117530	61180	31840
CAD	0	0	0	0	0
CAL	0	0	0	0	0
CV	16000	17140	18660	20160	20160
DC	3000	3000	3000	5160	3000
DPI	1800	1400	3100	1800	200
DPS	250	3000	3900	3800	900
GR	3000	3000	4000	5000	5000
GS	14600	14370	15100	15000	16100
OP	13000	8480	9800	8000	4000
P	11600	11400	11400	7100	6600
SS	11120	5540	7440	6660	6000
VEND	400	0	0	0	0
WP	11088	3500	3500	3500	1100
X	34900	26000	25900	3600	3100
TOTAL	188988	140790	223330	140960	98000

Table 16 shows that Agencies expect to spend most (30-52%) of their EDP training budgets on applications software training (AP). This category includes query and report languages such as MAPPER which are regarded more as applications software than system software. It also includes spreadsheet and database languages for the same reason (e.g. Lotus 1-2-3, Symphony, etc.)

The next category varies between the X or unallocated costs and site visits, conferences and seminars, and training equipment purchases (all unspecified). Between these two categories (CV and X) some 16-31% of the EDP training budgets will be spent.

The next highest amount is expected to be spent on general skills (GS) varying from 7-16% (increasing) of the training budget. This category includes inter-personal skills, planning and research skills, report writing, analysis and design.

Next comes expenditure on training in specific system computer operations (OP) varying from 7-4% (decreasing), then expenditure on training in programming skills (6-8%) (P) and then training in specific systems software (3-6%) (SS).

Finally, percentages of training budgets varying from 0 to 6% are expected to be spent on Computer Aided or Assisted Drafting or Drawing (CAD), Computer Assisted Learning (CAL), data communications (DC), introductory computing courses (DPI) and tours of State Service computer centres, data processing specialist courses (DPS) which are expected to include mainland training houses' courses (IPRI), computer graphics (GR), word processing (WP) and general or specific product demonstrations by vendors (VEND).

The high proportion of overt staff development costs being allocated to applications software is surprising.

One might expect a vendor to provide such training for free if they wish their products to sell. On the other hand, that cost would then have to be hidden in the product cost.

A number of Agencies listed MAPPER training as part of this category. Payment to the State Computer Centre for such courses is the norm.

Table 17

Expected number of trainee days per annum by broad category of EDP-related training

Source of data : See Table 2

CATEGORY	84/85	85/86	86/87	87/88	88/89
AP	1039	2750	2032	904	151
CAL	0	0	12	0	0
CAD	0	30	51	0	0
CV	20	28	28	28	28
DC	40	40	40	52	40
DPI	313	314	252	170	0
DPS	4	9	18	17	9
GR	15	15	15	15	15
GS	193	271	257	206	207
OP	170	109	120	80	30
P	120	153	148	125	120
SS	185	334	147	153	99
VEND	44	47	67	4	0
WP	197	281	166	106	21
X	5	20	15	15	10
TOTAL	2345	4401	3368	1875	730

Table 17 reflects Table 16 in that Agencies expect to allocate most (44-62%) of their EDP training days (just as they will spend most money) to training in applications software, except in 1988/89 when the most days are estimated to be spent on general skills training. General skills training is seen as an increasingly important proportion of staff development time, increasing from 8.23% in 1984/85 to 28.36% in 1988/89.

The next most consistent second-runner is the introductory courses and site familiarisation category, with 13.7% of allocated days.

Thereafter the pattern changes year by year with word processing, systems software, programming and operating skills forming the next biggest group and becoming an increasing consumer of staff time (between 17-35% in total).

The second most expensive category (CV) conferences, seminars and site visits, is estimated to take up less than 1% of allocated time in the years 1984/85-1986/87, rising to 3.8% in 1988/89.

As earlier indicated, only the overt costs of training are generally listed in the forms upon which these tables are based.

If the trainee days were to be costed at, say $80 per day, which is the standard used for many purposes, then $187,600 in 1984/85, $352,080 in 1985/86, and $269,440 in 1986/87 could be estimated as being costs in lost time attributable to staff development.

For those years, the cost of staff development on EDP training would then rise to $376,588, $492,870, and $492,770 respectively. Some of the additional cost derived above would be "real money" in that casual staff would need to be brought in to

cover key service points, in particular, but just how much falls into this category can not be estimated.

Table 18

Expected cost of EDP-related training by broad category of trainer

Source of data : See Table 2

CATEGORY	84/85	85/86	86/87	87/88	88/89
AG	39650	23750	20150	14600	1400
CAL	0	1500	2000	3000	0
CC	11000	11000	12000	12000	13000
DPA	0	0	0	0	0
IPC	0	1600	0	0	0
IPR	19100	17500	18500	19000	19000
PROF	3000	3160	3160	4160	4160
SCC	5700	6460	6040	6040	3900
TAFE	288	0	0	0	0
TPC	240	680	0	0	0
TPM	0	0	0	0	0
TPRI	0	1000	0	0	0
TU	0	2300	2300	0	0
VEN	65760	29640	60580	52060	41440
VENAG	0	0	61000	12000	0
VEN/CC	0	0	0	0	0
VENTP	0	5000	3000	0	0
VID	1250	1000	2000	1800	2000
X	43000	36200	37600	16300	13100
TOTAL	188988	140790	223430	140960	98000

Table 18 indicates that the vendors of Agencies' computer systems are anticipated to be the sector of the trainers who will reap most of these Agencies' EDP training budgets, ranging from 21-42%. Some courses will be run by companies who may or may not be the vendor (VEN/CC), some will be run by the vendor in conjunction with the Agency (VENAG) and this combination will possibly take 27.3% of the training budget in 1986/87.

Some will be run by the vendor in conjunction with another Tasmanian public sector Agency (VENTP). A high proportion (11-26%) is as yet unassigned to a particular trainer category (X).

The most interesting figure in this Table is the cost assigned to training carried out by the Agencies themselves (AG), which ranges from 21% in 1984/85 down to 1.43% in 1988/89. Most of this component is likely to be allocated to travel to and from regional offices for in-house training purposes.

The proportion estimated to be spent on obtaining interstate private industry trainers (IPRI) ranges from 8-19% of total EDP training budgets, whilst the local private trainers (TPRI) appear to be likely to get virtually nothing.

Computer companies other than the vendor of the Agency's computer (CC) are likely to be used fairly frequently as trainers as the figures indicate between 5-13% of training budgets will be spent on obtaining their services for a range of courses.

The State Computer Centre (SCC) is expected to be an ongoing recipient of the EDP training dollar, with between 3-5% per annum of Agencies' budgets for this purpose being predicted to be used for their courses. Department of Public Administration (DPA) computing courses appear not to be planned for payment by Agencies, but some minor payment to Tasmanian public sector Agencies other than DPA or SCC (TPC) was planned in 1984/85-1985/86.

Table 19

Expected number of EDP-related trainee days by broad category of trainer

Source of data : See Table 2

CATEGORY	84/85	85/86	86/87	87/88	88/89
AG	1082	833	781	625	66
CAL	10	15	25	25	5
CC	137	190	160	160	160
DPA	0	30	50	0	0
IPRI	62	90	60	60	60
PROF/VEN	0	4	4	4	4
PROF	20	20	20	20	20
SCC	192	183	177	149	117
TAFE	115	294	173	0	0
TPC	8	20	0	0	0
TPM	16	15	12	10	10
TPRI	0	5	0	0	0
TU	0	23	23	0	0
VEN	579	2495	511	492	183
VENAG	0	0	1202	205	1
VENCC	25	30	30	0	0
VENTP	0	15	2	0	0
VID	3	0	10	8	10
X	98	114	124	113	90
TOTAL	2345	4401	3368	1875	730

As Table 19 demonstrates, between 25-57% of trainee days are expected to be allocated to courses run by the vendors (VEN, VENAG) in conjunction with the Agency in some years.

The next highest category of trainee days will be those allocated to courses run the relevant Agency itself (AG). This figure of 19-46% of the total drops to fifth place in 1988/89, but as the figures for that year are known to be incomplete, it is conceivable that the rankings will in fact remain the same as for the previous four years.

The next highest category is for the courses run by or at the State Computer Centre (SCC) (4-16%), followed by those run by computer companies other than the vendor of the Agency's computer systems (CC) (4-8%, possibly 22% in 1988/89). TAFE courses, with 4-6% trainee days in the years 1984/85-1986/87 come next.

Then comes the unallocated category (X) with between 3-6% rising to possibly 12% of trainee days, and finally those courses run by interstate private industry (IPRI) with between 2-3% of trainee days, possibly rising to 8% in 1988/89.

The other allocations of trainee days consist of less than 1% per category in most cases, University and DPA courses being roughly equivalent.

Again, all these figures must be treated with caution. It is known that some Agencies have omitted figures relating to some non-EDP staff who are enrolled in University courses in Information Science, possibly because the DP managers are not aware of those enrolments.

3.6 DATA COMMUNICATIONS

Tasmanian Government Agencies' offices in the major centres of population are mainly linked to one of the Government's PABX systems. Data communications facilities, on the other hand, are installed on an "as needed" basis under the control of the client

Agency. Moves towards rationalisation of the inevitable proliferation of point-to-point lines are discussed in Section 3.6.2.

3.6.1 Projected expenditure on data communications

Based on the sources listed in Table 2, Agencies' projections of their expenditure on data communications costs are summarised in Table 20. In general, no prediction of inflation has been included in those figures.

Very few Agencies have purchased line terminating equipment, except for concentrators and multiplexors which concentrate or separate signals coming from the Telecom line terminating equipment. One or two have purchased modems, mainly for coupling telephone handsets to data signals.

TABLE 20

Data communications cost estimates
Source of data: See Table 2

YEAR	ESTIMATED COST
1984/85	460,360
1985/86	633,020
1986/87	1,096,260
1987/88	(797,590 - incomplete)

Prior to 1986/87 all data communication lines to the State Computer Centre were paid for by the user Agency.

A difficulty in prediction occurs because from 1985/86 all lines to the State Computer Centre were to be paid for by the Centre and recharged to user Agencies. However, some Agencies

have included predicted costs of those lines in their data for 1986/87 and it is highly likely that the costs of those lines have also been included in the Centre's Plan. Hence, an attempt has been made to discount the former in summarising the 1987/88 figures. The result is likely to be a not insignificant drop in estimated cost.

Further difficulties in estimation are caused by the lack of current data from the Education Department which has a major network (TASNET). The 1984/85 figures have been brought forward with no change into the next three years to give some indication of cost, however potentially inaccurate.

In summary, the data communications cost for the Agencies listed in Table 2 would appear to be approaching $1 million per annum, but may actually be around $0.75 million. Non-inclusion of some significant systems due to lack of data is estimated to offset any double-counting of SCC lines.

3.6.2 Types of data communication in use by State Service Agencies

Excluding the Police communications network, the sources listed in Table 2 indicate that around 112 synchronous and 325 asynchronous data communications lines of varying speeds were being leased from Telecom by the State Service Agencies at the time of writing their Plans.

However, a special report **(9)** prepared for the Computer Policy Advisory Committee in 1984 indicated that 466 lines were in use by **all** State Agencies (not just State Service Agencies) at that time and projected that over 620 lines would be required around the State to service over 960 terminals eventually.

The Hobart-Launceston main trunk route offers potential for line rationalisation, but this would be more likely to achieve greater economies if all the North-West and North-East Coast lines were also channelled to Launceston and thence to Hobart or combined from Burnie and Devonport especially and directed to Hobart. At the moment there are numerous individual lines from centres along both of those coasts which go direct to Hobart.

There is potential for rationalising data communications between the major centres of population. This has been examined by various Committees over the past five years but, until recently, not enough benefits could be demonstrated to outweigh the costs of establishing a Tasmanian Government communications network such as that which Queensland has established (QNET).

Even so, as already indicated, the major computer centres have begun to rationalise and control the number of lines coming into those Centres, as they must do if their computers are not to be overloaded. In so doing, they are able to recommend or to enforce sharing of lines when two or more Agencies in close proximity want to access the Centre. Consequently, lines have

been shared by Agencies occupying different floors of the same building, by Agencies occupying the same town and wishing to use a trunk link to another town, and some consultancy facilities management work is also being carried out by the facilities centres for some Agencies' data communications.

However, Agencies' autonomy and the autonomy of Administrative Units within certain Agencies limits the extent to which computer centres can force data line rationalisation.

Coupled with this is Telecom's monopoly and its virtual prohibition of strategies to establish private networks which, whilst they might save the State money and make the virtual data networks easier to manage, would reduce Telecom's revenue. Notwithstanding that commercial philosophy, the moves towards deregulation of telecommunications in Australia are growing and Telecom's attitude in the past two years has become more flexible and open to consideration of such options and they are now offering large customers facilities management services for combined private networks.

The Computer Policy Advisory Committee has encouraged the sharing of data communications facilities between Agencies who have like needs for point-to-point communication, particularly if those Agencies own or use the same computers or computers sold by the same vendor. In that way, line costs can be reduced and the potential for backup and automatic or semi-automatic switching to the other Agency's computer system for priority processing is encouraged.

Although most Agencies are using conventional DATEL Service lines, many are planning to use (or do use) the Digital Data Service and AUSTPAC packet-switching service for various applications. Within the cities an increasing use of optical data links is also being experienced.

The Tasmanian Government's electro-mechanical Hobart metropolitan PABX was replaced in September 1986 with a digital PABX. Five nodes have been installed in Hobart city, the Eastern Shore and Northern Suburbs. Controlled trials of data communication over the voice PABX's digital lines will occur in 1987. Although some low volume traffic could be coped with over these lines, it is expected that a full data communications overlay would have to be installed to cope with all Hobart area data communications traffic if it were switched through the same system.

If the figures indicate a need for such an overlay, the management of a combined voice/data Government communications network would have to be by a single Administrative Unit. This has major organisational restructuring implications as well as specialist recruitment implications but it is highly likely that this will be required.

3.7 ASSOCIATED COSTS

3.7.1 Accommodation and furniture

The Tasmanian Government has a Public Offices Committee which vets and coordinates the purcahse and use of, Government accommodation and furnishings. It, in turn, has a Furniture Advisory Sub-Committee which selects from tendered samples the range of furniture to be purchased each year for Government offices.

Since 1981 the ergonomics associated with the use of computer equipment has been the subject of a great deal of attention in the community. The Government Services of all States and the Commonwealth have, to a greater or lesser degree, reflected this community concern by establishing guidelines for the physical working environment of VDU operators, in particular.

The Tasmanian Government's Guidelines for VDU Usage and Installation **(10)** are the basic set of principles for the Tasmanian State Service.

Although ergonomics is a broad subject, most attention seems to have been paid to lighting and to the provision of so-called ergonomic furniture.

Consequently, the Government's Furniture Advisory Sub-Committee annually selects a range of "ergonomic" furniture for users of screen-based equipment and keyboard equipment to meet those Guidelines (as revised from time to time).

Due to the proliferation of keyboard and screen units, the cost of furniture provision is concomitantly increasing. The cost per annum in the Tasmanian public service agencies is approaching half a million dollars. This re-equipping of offices has to be taken account of by Agencies in submitting proposals for approval to develop or obtain computer-based systems. The benefits should outweigh the full costs, including furniture and other environmental amendments.

Those Agencies which have minicomputer systems vary in their accommodation from ordinary offices with no or minor extra air-conditioning, through to fully-designed and security-sytem-protected computer rooms with false flooring, gas systems for fire control, security locks and so on.

The major computer facilities centres have a variety of these features. The Education Department's Elizabeth Computer Centre, though, is, at the time of writing, housed in demountable huts. The Transport Department's facility is in an internal office area with full air-conditioning, false flooring, and certain monitoring systems. The State Computer Centre, housing the general purpose Sperry mainframe system and the Financial System's ICL equipment is purpose built and the largest and the most modern.

The 1984/85 Budget included $164,000 for Stage 1 of extensions to the SCC's computer room. Access to the SCC is

strictly controlled, with receptionist areas and electronic control of access doors. However, it does not have the full video surveillance systems and armed guards which the Queensland Government's State Computer Centre (and some others) have.

In 1978, when the SCC was being planned **(3)** the building was "designed to accommodate anticipated internal expansion for the first ten years of operations". Although the design allowed "for building expansion of both floors" this was expected to occur until the end of that period. Expansion has come 5 years early.

3.7.2 Bureau processing costs

Agencies' estimates of the cost of their use of computer bureaux for data processing are summarised in Table 21.

Table 21

Estimates of the costs of using computer bureaux for Tasmanian State Service data processing

Source of data: See Table 2

YEAR	PUBLIC	PRIVATE
1984/85	744695	205500
1985/86	1222400	281700
1986/87	1312600	290500

As can be seen, by far the largest amount of bureau expenditure remains in the public sector, the majority going to the State Computer Centre. (As already indicated in Table 1, the

SCC's estimated revenue for 1985/86 was $2,125,000, nearly all of which would be recouped from other Tasmanian Government Agencies.) The other main public sector bureaux which feature in this figure are the Transport Department and CSIRO.

The private sector expenditure estimates are about equally split into processing costs, database access and COM production costs, the rest being data preparation and equipment maintenance costs.

3.7.3 Cost of consumables

Table 22 summarises the Agencies' estimates of the cost of computer-related consumables and other operational costs not specified elsewhere.

Table 22

Estimated cost of consumables and other operating costs not specified elsewhere

Source of data: See Table 2

YEAR	CONSUMABLES and OTHER COSTS
1984/85	181356
1985/86	928146
1986/87	1033846

The Transport Department is easily the highest spender in this category with over $0.5 million per annum estimated expenditure on consumables and other costs. Another major contributor to these figures is, as may be expected, the State Computer Centre with some $150,000 projected for 1986/87.

3.8 Summary of financial investment

The trends shown by their EDP Strategic Plans in investment by Tasmanian State Service Agencies in information technology and its associated resource requirements are summarised in Chapter 5.

Including public sector bureau costs, investment in computing is estimated to be around $11,497,222 in 1984/85, $14,211,892 in 1985/86 and $19,366,676 in 1986/87.

Excluding public sector bureau costs, these figures reduce to $10,608,527, $12,673,992 and $17,724,076 respectively.

Of these figures, between 18-33% is allocated to capital equipment costs, 34-14% to associated recurrent costs, 31-40% to staff costs, and 1 - 6% to each of software, staff development, consultancy, data communications, consumables, and private bureau costs.

4. MANAGEMENT CONTROLS AND RISK MANAGEMENT

4.1 The Computer Policy Advisory Committee

The functions of the Computer Policy Committee and its successors since 1980 have been: (11)

1. To coordinate and maintain a general oversight of the use of computing and associated automatic data processing facilities throughout the Tasmanian Government service, including Departments, instrumentalities, authorities and Agencies of the Crown;

2. To co-ordinate the operations and policies of any State-owned computer facilities;

3. To investigate proposals for the acquisition of computers, ancillary devices, computer systems, word processors, software and support services including the use of non-Government computer bureaux services, and to determine, subject only to Cabinet directive, availability of finance, and any restrictions which may exist under legislative and regulatory provisions whether or not such proposals should be proceeded with either in whole or in part;

4. To co-opt the services of specialists and to establish such Sub-committees and Working Parties as it considers necessary to enable it to fulfil its functions;

5. To ensure provision is made for safeguarding the privacy of personal information held within computer files;

6. Generally to advise Cabinet on the financial implications of any proposal falling within the scope of its responsibilities and upon any matters associated with computer services policy and administration which it considers could have a bearing upon the Government's policies including:

- The impact of technological development upon employment and education;
- Security standards;
- Development priorities;
- Recruitment and training; and
- Retraining and redeployment.

7. Of its own motion, to recognise as Facilities Centres such data processing facilities operating within Agencies as, in the opinion of the Committee, is deemed appropriate for the proper coordination and administration of the State's computer services;

8. To issue, from time to time, detailed guidelines relating to the acquisition, management, administration and security of computer equipment and to promulgate such guidelines throughout the Government service;

9. To make an annual report to Cabinet.

The Committee requires all proposed developments using computers to be submitted to it in a particular format for approval. Approval, if given, is subject to the availability of finance, and any other necessary riders. Some delegation of authority to the Chairman and Secretary exists to expedite certain types of submissions.

CPAC also requires all State Service Agencies to annually submit an EDP Strategic Plan to the Committee for approval. In that way, the major task of coordinating computing and establishing Service-wide strategies ought to be able to be assisted.

The EDP Strategic Plans cover major achievements of the previous year, intentions for the current year, and plans for at least the next two years.

Agencies are required to back up the narrative with standard forms detailing their hardware, software, communications, staffing, financial summaries and so on. (See Appendix A).

At the time of writing the Computer Policy Advisory Committee approval is the corner-stone of all investment decisions related to computer purchases and system development in the State Service. However, there are other significant central Agency controls, including reviews of the Auditor-General, financial provision and tendering procedures.

4.2 Audit Controls

The Annual Report of the Auditor-General has highlighted a number of areas in the Tasmanian State administration which could be assisted by computerisation to provide a more responsive, better controlled, or more cost-effective service.

For example, the computerisation of hospital records is a long standing issue in the Auditor-General's Reports. In 1981 a paragraph was devoted to the progress and problems encountered in using a Victorian company, Health Computer Services, to computerise payroll processing **(12)**. After featuring in subsequent Reports, the 1984/85 Report devotes nearly a full page to the Health Sector's computing requirements **(13)**.

The Auditor-General has also detailed failure of computer systems or gaps in the management of the development of those systems.

For example, in the 1980/81 Report **(14)** computerisation is given as part of the reason for the Supply and Tender Department's loss on trading which "is a direct consequence of changes to the accounting system and the problems of timing relative to accounting information provided by the computer, and that provided from ledger accounts."

Similarly, he detailed the development (at his 1978 advice) of a system design for the Agricultural Bank which, after parallel running in 1980, was abandoned **(15)**.

Comments on the Government's slow development of the Computerised Financial System, have appeared in the 1984/85 Report **(16)** as did an in-depth critique of the Education Department's Computerised Accounting and Management Information System (CAMIS) and other matters of concern **(17)**.

He also brought to public notice the perilous state of the Education Department's Elizabeth Computer Centre's security and poor accommodation **(18)**.

Apart from the Auditor-General's DP auditors, of which there are very few, virtually no post-implementation audit is carried out. The Computer Policy Advisory Committee annually or periodically compares each Agency's EDP Strategic Plan with its previous one to highlight discrepancies, delays or other problems (and to applaud successes, whenever possible). The results of

that comparison are conveyed in writing to the Head of the Agency, the Minister responsible for the Agency, and the Auditor-General, so a further reminder of review of such systems is provided in that way. Agency Heads, of course, ought to be carrying out such reviews themselves. To assist this process, the Computer Policy Advisory Committee insists on a full cost-benefit analysis of each proposed acquisition or project as part of its approval process. A major problem is that many of the benefits foreseen by the Agencies are intangible and consequently difficult to cost. Concomitantly their achievement is also difficult to gauge and so proper review after implementation is made harder.

The Auditor-General's Report is also one publication in which, from time to time, detailed costing of computer purchases can be found.

For example, in his 1980/81 Report **(19)** $45,251 was listed as having been spent on computer equipment by the Education Department **(20)**, $2,856,188 was spent on building the State Computer Centre **(21)**, $116,018 for a shared computer system by the Herd Improvement Board and the Tasmanian Dairy Industry Authority **(22)**, $14,835 for the Schools Board computer **(23)**, $985,722 in 1981 and $954,486 in 1980 for Transport Department computer equipment **(24)**.

In other Reports, figures such as $2,227,394 in 1983/84 and $2,318,588 in 1984/85 for computer equipment and system

development fixed assets for the Totalisator Agency Board can be found **(25)**. $92,175 of that total was spent in 1984/85.

Sometimes more detail than usual is given, as is the case with the detailed summary of Treasury's Computer Services Branch (State Computer Centre) income and expenditure for 1984/85 **(26)**.

In that year, a summary of the composition of the source of funds for the new Government Computer and Other Equipment Purchases Account was also given **(27)**. The Auditor-General also provided some information about the Government's Computerised Financial System (CFS) - expenditure to 30 June 1985 totalled $2,254,937 plus $405,577 in associated costs ($140,133 in 1983/84 and $265,444 in 1984/85). He made certain comments on the fact that a contract had still not been signed, and that the original implementation date of January 1985 had not been met **(28)**.

4.3 Treasury Controls

As already indicated, Treasury has for the past two years collated Agencies' bids for computer-related expenditure on equipment and has allocated a sum from a Trust Fund for this purpose.

Treasury has also issued certain instructions that all communications lines into the State Computer Centre will now be coordinated and paid for by Treasury in order that some control on access to, and planning for, the use of that Centre can be effected.

Treasury control of recommendations regarding most Agencies' financial allocations in the preliminary and some subsequent stages is, of course, one of the most significant administrative controls on computing in Tasmania.

4.4. Supply and Tender controls

All purchases of property, including computer equipment and software, must be made through the Supply and Tender Department. Bulk purchase contracts are negotiated from time to time to cut down on the need to call spot tenders for common equipment such as terminals and personal computers.

Disposal of computer equipment is also carried out by the Supply and Tender Department, in conjunction with the Computer Policy Advisory Committee Secretariat. Every effort is made to redeploy equipment if it is still useable, rather than selling it. Such coordination is successful approximately 40% of the time at present.

4.5 Summary of central Agency controls

Some other Australian States such as Western Australia have established super-structure Departments responsible for all computing and communication matters. This is not the case in Tasmania, where administrative control and coordination is

currently dispersed amongst a number of committees and Departments.

Nevertheless, Tasmania is required to provide the same range of computing services as other States, and at the same level of sophistication within applications. Coordination, and control therefore, are a similar problems, albeit in relation to a lesser value of installed base than in other States.

Continuing reviews of the need for changes in this administrative control picture are moving towards the time when rationalisation of currently disparate resources will prove more attractive. This will partly be technology-driven.

4.6 In-house management controls and risk management

The CPAC Guidelines for the production of EDP Strategic Plans stress the need for management to institute controls at each stage of the development and operation of computer systems to ensure that the systems are meeting the corporate goals of the Agency. Only one Department whose Plan was examined for this Analysis admitted to having no internal controls other than the production of an annual Plan.

Many Agencies have committees to oversee or review the development and operation of computer systems. These committees

vary markedly in their composition and in the frequency with which they meet. Most Agencies establish ad-hoc project review or implementation teams, though.

Few Agencies emphasised accountability for EDP systems. The Audit Department indicated that "all time worked is to be fully accounted for" in their Agency, and both Audit and Forestry said that the manager of their DP or information operations is fully accountable as is every other section within those Departments.

Although the production of EDP Strategic Plans is supposed to be part of the corporate planning process and be based on corporate goals, most Agencies do not have a corporate data model or a corporate information plan. Forestry is one of the few Agencies which use a corporate data model in this way.

Most Agencies produce their EDP Strategic Plans annually, as required. However, several have not, pending the results of consultancies or due to the low priority they place on such plans. On the other hand, some have introduced more frequent revisions of their Plans.

In analysing the costs and benefits of proposals, Tasmanian State Service Agencies are required to use the Computer Policy Advisory Committee's Guidelines on Cost/Benefit Analysis. In addition, Agencies use a variety of criteria for selecting which proposed projects should go ahead, and so their perception of costs and benefits also varies.

Few Agencies mentioned what level of system specifications are required before a project can start, and virtually none mentioned such practices as signing off specifications and signing off completion stages as per specification, which are normal practices in the private sector. A couple of Agencies stated that Divisional Heads or other nominated staff will be responsible for production of user specifications at the beginning of all projects.

The Tasmanian State Service has no required standards for EDP project control. Many organisations in other states have adopted commercial or proprietary methodologies which are not used in the Tasmanian State Service. Most TSS Agencies seem to use ad-hoc in-house and idiosyncratic lists of things to look for and lists of responsibilities plus schedules of varying levels of details, seeming to follow no particular standards for programming, documentation of programs, user manuals, network design and so on, but rather what the main analyst/programmer or similar employee associated with a project seems to prefer.

At least 8 Agencies of those examined did not address the question of what risks were attached to their computer usage, what exposures were relevant, and what controls had been put in place to reduce those risks.

Surprisingly few Agencies mentioned staffing factors as a risk. Lack of staff training was recognised as a risk in the auditing profession, retention of suitably trained staff was recognised by some as a risk, and some others acknowledged a risk in their increasing reliance on the expertise of EDP staff. One Agency has determined that no skill should be concentrated in less than two staff as a means of reducing that risk.

Several Agencies recognised the health risks associated with staff using computing equipment, particularly screen-based equipment. All State Service Agencies are required to provide ergonomic furniture and other aids so that stress and Repetitive Strain Injury can be minimised. They are also required to ensure that guidelines on the provision of work breaks and proper lighting are adhered to, and all operators of screen-based equipment who use that equipment for 25% or more of their working day are required to undergo a full ophthalmic examination to minimise the potential for eye damage through the use of that equipment.

Some Agencies have gone further and deliberately involve their users in system design and provide counselling and restrictions on the use of word processors.

The Public Service Board produced guidelines and inspected workplaces when possible to ensure that proper management advice was available to Agencies on potential health risks and ways to

prevent them. The Department of Public Administration, the Public Offices Committee, the Department of Health Services and the Department of Labour and Industry continue to do that within their limited resources.

The inability of Agencies to meet Government's demands for information and to manage their resources without computerised assistance is beginning to be regarded as a risk. Reorganisation of Agencies is common, but often the management information systems required to underpin that new structure are not put in place for some time, so the benefit of the restructuring is delayed or impaired.

Some Agencies have major environmental risks to their computerised systems. As already indicated, the Education Department's Elizabeth Computer Centre is one of those. Some Agencies, on the other hand, have gone to considerable lengths to physically secure their major equipment by building specific computer rooms with an adjacent room for a computer operator to observe the equipment and to monitor access to the room. They have also installed electronic sensing equipment linked to building security systems. Most, however, have not gone to that amount of trouble as their installations at present are only relatively small. One or two Agencies who are planning more significant purchases are indicating their plans to ensure that the equipment is protected from fire and is secure.

Few Agencies have emergency electricity supply systems in place. Some acknowledge the problem of fluctuating power supplies and the damage which surges can do. One Agency analysed the supply before building their computer room and were advised that a line conditioner was not necessary. One proposed to require a non-fluctuating supply if they get their own system.

Very few Agencies seem to restrict physical access to terminals or at least acknowledge that easy accessibility increases risk of illegal system access. Hardly any Agencies indicated that they are using lockable terminals although some lock their tapes and disks in particular rooms.

The risk of the computer systems in use by TSS Agencies being inadequate for the increasing demands of the Agency was recognised by few. One Department is concerned that their installation may subsequently prove to be inadequate in some way for as-yet-undeveloped applications, especially system-hungry interactive software. That Department believes that it will be crucial to use distributed processing through micro computers to alleviate the load by mounting non-shared systems locally instead of on the central resource. Another Department intends to rely on the State Computer Centre's capacity to cater for its future requirements.

Although many Agencies have maintenance contracts on hardware and some on software few mentioned the use of these contracts as a method of risk reduction.

Most TSS Agencies use and greatly rely on one or more shared systems. All are required to feed data into the State Service Personnel System, for example.

Most have been prevented from developing financial systems pending the purchase, testing and installation and extension of the Treasury's Computerised Financial System. The fact that this system has not been installed as quickly as planned and is still only installed in a few Agencies is deemed by many Agencies as the cause of them being exposed to the risk of not having the financial management information which they require if they are to meet Government's changing financial information and management demands.

One Department acknowledged a risk which they are running of not being able to meet the demands for digital topographic and cadastral data which other Agencies are asking be supplied. The integration of land information through standardisation of data and sharing of data and information on what data is being computerised is central to efficient government. Hence a Land Information Secretariat and research unit has been established to set standards and coordinate the production of data.

Reliance on other Agencies for software and hardware sits comfortably with some but others have consciously tried to reduce any such risks by obtaining in-house equipment and specialist staff. This, of course, increases other risks but it does give Agencies more direct control over their planning for and use of computerised systems.

There exists a risk that present systems which represent early stages of longer-term developments may not be completed if the Government does not provide the required funds for the Year 2 and following stages when it is required. There also exists a risk of not being able to make use of the skills of staff recruited for that purpose. These problems have been recognised by several Agencies which require major replacements for their old equipment in order that the systems developed on that equipment can continue to be used and be extended to meet the information requirements of that and other Agencies.

Some systems do not have any manual backup in the case of power failure or other disaster. They include major systems such as the Lands Valuation rolls which have been computerised and reside on the Sperry at the State Computer Centre.

Loss of data through deliberate or inadvertent damage to electronic media is recognised as a risk by many Agencies, but not all. Some rely on the host computer centre's back-up and recovery

procedures for the systems which those Agencies have mounted on the centre. Agencies with in-house mini-computers have developed varying back-up procedures to reduce the risk of lost data. Most depend on regular backups being made of diskettes or disks, backups being kept in a secure place separate from the originals, regular backup of hard disks to diskettes or tapes, and some store their backups off-site (or propose to do so). A few Agencies with high volume real-time transaction processing additionally log all transactions to a separate disk, although this is unusual.

Only one Department mentioned the need for emergency backup being required to be available from another suitable computer facility. The State Computer Centre has an emergency plan to process critical applications at another site but has never been able to test that backup facility fully.

One Department said that they protected the privacy of people through controlled shredding of printouts containing personal information. They limit access to printouts to only a restricted number of designated staff and then shred the printouts or remove personal identification data from the paper copy to attempt to further secure the data.

The Computer Policy Advisory Committee requires Agencies to register all systems which contain personal data. The owners of the data are required to adhere to Guidelines on the privacy of personal data. Not many Agencies mentioned how they ensure adherence to those Guidelines.

Password control is the most commonly-used method of protecting access to all or parts of the computerised systems once physical access has been obtained. Most rely on compulsory input of a password for shared systems, with each user individually registered to the system and regular changes of password being required.

Use of system restrictions on access to modules or parts of software modules is not so common, although some mentioned this form of control in which the system is able to restrict the use of each type of transaction at both the user and the workstation level.

There is evidence, however, that with the increasing numbers of microcomputers in the Service and the increasing reliance on commonly-available software packages such as Lotus 1-2-3 and others which can not be password-protected, there will be increasing risk of illegal access to data.

Only one Agency proposed restricting manual maintenance access of databases to a minimum number of staff. Restrictions on file copying were mentioned by a few Agencies. Random checks of console logs to prevent unauthorised access is carried out by most Agencies with shared or mini-computer systems.

One Agency proposed moving systems containing sensitive data inhouse onto microcomputers believing that it could thereby be better protected.

Only one Agency mentioned the need to control changes to program code, proposing to restrict the ability to do so to the system controller.

Only one Department seemed to be concerned about the security of data communications lines and proposed that "lines must be secure" but did not suggest how this could be achieved.

In summary, very few Agencies were able to identify and enumerate the risks associated with their computer systems and the methods which they employ or should employ to reduce those risks.

This apparent inability might reflect an absence of those risks, but it is possible that the risks are simply not being recognised in many Agencies and are therefore not being managed.

5. CONCLUSIONS

5.1. Introduction

Computing in the Tasmanian Government Service has a 30 year history. Use of computers for administrative purposes has a 20 year history. Major planning for use of computers for administrative purposes began only 10 years ago and mainframe capacity became a reality less than 6 years ago.

During the 30 year period, the computing industry has undergone several revolutions from the transistor-based machines of the 1950s, through the "second-generation" integrated circuitry of the 1960s, to the microcomputer developments of the 1970s, and the "very large-scale integration" or VLSI chips of the "fourth-generation" late 1970s/1980s technology.

In the same period, the type of people needed to make computers work have changed from the highly specialised hands-on (or hands-in) technocrats of the 1950s.

The technological advances have taken the power of the 1950-80 technocrats and put it in the hands of the non-professional clerk and the Agency managers for most applications, if they wish to use them.

Yet the Tasmanian State Service Agencies' EDP Strategic Plans only partly reflect this desire to take control of their own data processing.

5.2 Expectations

The emphasis placed on the State Computer Centre and the time which it has taken to build up similar services to that which many mainland computer centres were providing in the late 1970s has meant that TSS Agencies' expectations of such centres has suffered a time lapse, in many cases. The Information Centre concept was introduced two years ago in Tasmania after many years of operation elsewhere. That concept was the first overt effort by large DP shops to institutionalise the user-technocrat interactions and to improve that relationship. Its introduction to the State Computer Centre was regarded as a major step forward and welcomed by SCC users. This reaction at that time is symptomatic of the time warp involved in TSS user expectations and management understanding of the modern possibilities in computing.

The reaction possibly also reflects a fear of the technology and an acknowledgement of managers' reliance on the Centre and on its expertise which Agencies have been encouraged not to develop in-house. Indeed, when the Centre's first computer contract was let in 1980, it was heralded as being all things to all Agencies, and the associated computing staff were intended to provide a pool of experts on whom all Agencies could call. **(29, 30)**

These were admirable sentiments, if dated at the time. But in many ways the intentions have been fulfilled for many smaller Agencies in particular, and the SCC still has a role to play in providing a facility on which large common-use systems should be mounted, and a role in providing that pool of expertise on which Agencies can call. Those roles were always the intentions of the Centre's planners. **(3, 4)**

However, the move to a distributed processing environment away from the State Computer Centre and towards a more localised processing environment has progressed slowly since the early 1980s and only by those Agencies whose needs could not be met by the SCC. They include the Education Department, Transport Department, State Library Department and the Forestry Department, and recently the Department of Tourism. Yet many Agencies still run systems at considerable cost on the State Computer Centre which could more cheaply be run in-house if they had the expertise and equipment to do so. More enlightened sectors of the Service are pushing for the Centre to assist in achieving distributed, modern solutions, and the Centre and others are providing some resources for that purpose.

5.3 Planning and management

It is difficult to estimate the resources really needed and the direction that should be given to ensure that the Government's, the State's, and the Agencies' needs are met in the

most cost-efficient manner when no forward plan exists for most Agencies and so, in many cases, minimal forward planning is done for the computing resources underpinning the Agencies' administrative operations.

The EDP Strategic Plans of many Agencies are disturbing in their indications of the Agency Managers' inability to undertand the strategic importance of computing to their operations. An even more fundamental indictment is their mute evidence of the apparent lack of general planning in particular Agencies. This criticism must, of course, be ameliorated by some Agencies' difficulties in predicting what the Government will require of them in the coming years and by the lack of forward planning ability caused by the stop-start virtual 8 months' expenditure/supply cycle in the Tasmanian Government service.

There are a few strong exceptions to the general mediocrity, though. Some Agencies are quite outstanding in their ability to plan for computing needs and in their recognition of the need for contingency planning or disaster planning. Yet few have been able to develop any viable and tested disaster plans.

Most EDP Strategic Plans merely report successes and failures and comment conservatively on topics required by the Guidelines. Few show any innovation and some Agencies have complained that they don't have the time nor see the need to "fill out forms" and tell the Computer Policy Advisory Committee what

they are doing. The fundamental inability of such managers to see the need from their own Agencies' point of view to record and plan their computing resources is glaring.

5.4 Management controls and risk analysis

The CPAC Guidelines for the production of EDP Strategic Plans stress the need for management to institute controls at each stage of the development and operation of computer systems to ensure that the systems are meeting the corporate goals of the Agency. Only one Department whose Plan was examined for this Analysis admitted to having no internal controls other than the production of an annual Plan.

In summary, very few Agencies were able to identify and enumerate the risks associated with their computer systems and the methods which they employ or should employ to reduce those risks.

It is possible that risks do not exist, but it is equally possible that the Agency managers and their EDP staff do not recognise the existence of certain risks and are therefore not attempting to minimise exposure to those risks.

It is also disturbing to see the lack of internal consistency between parts of some Agencies' Plans. One form requires them to indicate how many EDP staff will be required in the next four (and preceding one) years. It also requires them to

estimate the salary of each of those types of staff and to summarise the total salary costs for EDP staff at the bottom of that form. It should be identical, then, to three of the columns in the 3-year financial summary form at the end of the Plan. Often it bears no resemblance in any year.

The result of this and many other inconsistencies is that no accurate picture of expenditure and projected expenditure on computing in the State Service is possible. All figures in this Dissertation, therefore, must be treated with caution and be regarded as ball-park or indicative rather than absolute figures.

5.5 Trends

Having said that, the analysis of the Plans has shown up some relativities and trends which are worth summarising here.

An increasing proportion of TSS computer purchases is being made from Loan Funds or by leasing, instead of being purchased from Consolidated Revenue sources. However, the decreasing amount of Loan Funds over the past 18 months will result in Agencies having to reassess their priorities and reallocate funds, if possible, to purchase high-priority equipment if emergencies arise.

The published costs of computing as shown in Agencies' line budgets are at least 66% less than the real costs. Overall, it is

estimated that at least 121% of published costs is the real annual expenditure on computing in the Tasmanian State Service as many Agencies do not list any computing costs in their line budgets, yet show those costs in EDP Strategic Plans submitted to CPAC.

Increasing numbers of personal computers are being bought instead of terminals for roughly the same price in many cases. This will force a technology-driven trend towards Agency-distributed, rather than Centre-distributed computing, or towards localised processing, and away from the mainframe systems.

Such a trend will be in tune with other States and has many attractions. It is equally a Pandora's Box of problems in controlling and ensuring compatability, data security and privacy, efficiency in the use of human and other resources, and timeliness. Unless Agency Managers have a clear plan into which the Agency's computing resources fit, it is highly likely that the technology will force the pace, rather than supporting and complementing the corporate or Agency forward planning. It is also likely that too much capacity will be purchased for some Agencies and none for others due to the lack of an overall Government Service technology development plan.

Only 0.083% of State Service computing expenditure is related to Service-wide policy development and coordination. A Minister for Technology exists without a Department, the portfolio having been created in 1986. He has no direct connection with the

Government's Computer Policy Advisory Committee which reports to Cabinet through the Minister for Public Administration. The Government has no information technology policy.

A very conservative estimate of the installed computing equipment base is that equipment which has cost nearly $11 million is still in use. Most of the equipment was purchased or leased from 1983-1986, but equipment purchased in every year since 1974 is still in use by Tasmanian State Service Agencies. Re-equipping of outmoded technology ought to be a priority, as the recurrent costs (mainly maintenance costs) are now approaching 20% per annum and the ability and capacity of at least half of that equipment has long been surpassed.

A 5-years rolling re-requipping plan could be devised for the State Service to ensure that the most modern technology is in use in key areas and so that recurrent costs may be minimised.

Projected upgrades and new system purchases are estimated to require anything up to 5 times the available funds. Given that ambit claims are often made for computing equipment and software, it is still necessary to take these figures seriously and to question whether this State should do as some others have and saturate the Government Service or key parts of it with compatible state-of-the-art information technology to meet all perceived needs for the next few years by one major bulk purchase. This has certain discount and management advantages.

An increasing percentage of expenditure on software is expected to go towards purchase or lease of applications software. Whereas in 1984/85 35% of such expenditure was on applications software and 65% on systems software, these relativities are expected to reverse by 1986/87 with 58% being spent on applications software. At the same time, the software budgets are expected to require 105% more than in 1984/85, reaching at least $812,000 per annum overt costs.

The change in emphasis reflects a change in user expectations. Most Agencies do not expect and will not pay for the long system development cycles common in the 1970s and even in the early 1980s. Many government administrative functions and many research functions are able to be supported now in large part by packaged software with some customisation being the only changes expected to be necessary.

Alternatively, Agencies will opt for "fourth-generation" languages that give them a quicker development time, more control over customisation, and less specialist staff being needed than in the traditional approaches to coding software from scratch.

This change in emphasis and expectations has several related implications.

Firstly, it may now be possible to negotiate multi-user, multi-site licences for commonly-used software.

Secondly, there should be less need for pure programming staff who currently represent between 20% and 22% of the Tasmanian State Service's EDP staff (according to the estimates provided by the Agencies in their Plans.)

There will be a greater requirement for analyst/programmers and straight analysts, who combine to form 28-35% of EDP staff at present. Some redesignation or reskilling of programmers to take on these roles may be necessary.

The current analysis has shown that Agencies expect no real growth in the number of EDP specialist staff in the years 1984/85-1988/89, yet a growth in salaries is indicated as being expected. However, given the relatively low salaries of all staff in the Tasmanian State Service, this total EDP salaries figure of $5,281,000 for 1986/87 (estimated) may not eventuate.

An increasing use of clerical staff who are now regarded by the Agencies as specialist EDP staff is evident.

TSS Agencies expect to increasingly use private sector consultants for EDP management and analysis advice, whilst the use of public sector programming consultants is also expected to increase.

The use of consultants or EDP contract staff on all but the major Tourism and Treasury systems is expected to cost about $0.5 million annually.

The trend towards expecting to use packaged software rather than reinventing the wheel is reflected in staff development estimates. Expected expenditure on staff development in EDP skills is estimated to be less than $0.25 million per annum, but adding lost time due to training, that figure approaches $0.5 million per annum.

Most of the EDP staff development budgets (30-52%) and most of the trainee time (44-62%) is projected to be allocated to training to use particular applications software or applications software query and report languages.

Most of the training budgets for these purposes will be paid to vendors of the Agencies' computer systems (21-42%). Most trainee days will be spent attending courses run by those vendors (25-57%) or the Agency itself (19-46%).

Virtually no time nor funds is anticipated to be spent on training in the skills of capacity planning or contingency planning, yet it is obvious from the "urgent" submissions received by the Computer Policy Advisory Committee for upgrades to both major and minor systems that training in such skills ought to be mandatory for all EDP managers in particular. However, as many

TSS Agencies do not have any EDP management staff, as such, and as many TSS Agency managers have minimal understanding of information technology, the need for such planning appears not to be recognised and is consequently not being sought.

In addition to the lack of recognition of the need for management control and risk minimisation, analysis of projected estimates of the use by non-EDP staff and others of TSS computer systems adds weight to the claim that training in capacity and contingency planning ought to be the highest priority for the Service.

These figures indicate that the years 1984/85-1987/88 will see a 220% increase in non-EDP staff users of TSS computer systems, and a 208% increase in computer time used by those people.

The biggest bald increase will be in those requiring access for less than 1 hour per day (245% increase) with more users wanting longer access times in the 2-4 hours per day slots.

It is clear that such a change in user profiles will also require far easier to use software than most systems currently feature, otherwise a very high level of skills will have to be developed and maintained by increasing numbers of non-EDP staff.

It is also clear from the staff development estimates that the traditional training or education centres, including the DPA's staff development programmes and the University's Information Science and other offerings, are not regarded (rightly or wrongly) as being able to meet TSS Agencies' EDP training requirements. Virtually none of the Agencies seem to expect those institutions to provide the training which they estimate will be required.

Integration of systems currently mounted on a miscellany of computer brands may be needed soon. Integration of communications technologies will or ought to assist that requirement to be met.

Data communications costs of around $0.75-1 million per annum are estimated to be being incurred by TSS Agencies. Rationalisation of data communications lines and integration with voice communications lines plus protocol conversion devices would appear to have both cost savings potential and access improvement potential without the need for yet another major re-equipment exercise.

Such an integration would require a restructuring of the currently disparate control centres which impact on information technology in the TSS, including aspects of Treasury, the State Computer Centre, the PABX managed by the Department of Public Administration, the Computer Policy Advisory Committee, and aspects of the Supply and Tender Department. Such a restructuring is widely supported and may be appropriate to be led by a Minister for Technology.

Given some recent notable budget blow-outs **(31)** on EDP projects and controversies surrounding major EDP purchases, the analysis of the TSS Agencies' EDP Strategic Plans provided in this Dissertation lends credence and indeed urgency to the need for examination of the potential for usch a radical restructuring. The objective of any new integrating information technology structure would be to provide research and coordination and direction to meet the information infrastructure and strategic needs of Government in a timely fashion.

The published figures for DP-related matters in the 1985/86 Budget Papers totalled $9,336,590. In the 1986/87 Budget Papers, they total $9,629,590. **(32)**

Based on the conclusions drawn from analysis of published and unpublished 1984/85 figures then the real cost of EDP should be that figure plus 121% of that figure, i.e. $11,651,804, for a total of $21,281,394 per annum. This may be compared with the result based on the analysis of EDP Strategic Plans forward estimates, which shows the 1986/87 figure would be $17,724,076. This figure is known to be underestimated as some Plans are incomplete for 1986/87. It must be time for some full-time research, planning and optimisation resources to be established.

5.6 Options for organisational structures

There are a range of options available to bring into effect without excessive establishment expense a reorganisation of existing Administrative Units and responsibilities to assist in the optimisation of the currently disparate resources in central

State Service Agencies which have an impact on the development and investment in computing.

If the power of the Government as an information technology purchaser and a developer is to be harnessed, then a separate Department of Technology appears to be an attractive option. Such a Department could use the estimated annual Government investment of $5 million on equipment purchases, and other direct investments as a bargaining tool to facilitate the complementary role of local industry encouragement. Direction of such a budget makes industry offsets more of a realistic possibility than they can be at present. Conversely, a prerequisite would have to be a Government policy of preferred suppliers whose equipment is compatible and is of such a range and with such a good range of software to make it viable for the diversity of Government computing requirements to be met from the selected range of suppliers.

Preferred suppliers and associated offsets are common in other States and in the Federal Government purchasing patterns.

The likely need to replace a large proportion of the Tasmanian Government's computing resources within the next few years makes the establishment of such policies and such a Department an even more attractive option.

It would require the amalgamation of either the resources or the buying power of parts of the Tasmanian Development Authority, the Treasury Department's State Computer Centre, the Education

Department's computing facilities, the Transport Department, and possibly the major non-State Service computer purchasers to produce sufficient influence to make this option an optimal structure, but this is not impossible. It would also require the Trust Funds established for computing purchases to be placed in the control of such an Agency and for those funds made available for leasing purposes to also be controlled by this Department. A guaranteed level of funds for 3 years is also needed so that a rolling five-year buying and development plan can be devised.

An alternative option is for the amalgamation of all computing and communication service units which are currently controlled by a number of Agencies. Such a combination could be part of the Department of Technology or could be independent of it. The combination of service units has been mooted for some years by the Auditor-General, among others. In 1982 the Audit Department carried out a survey of all communication costs in the State Government for the Computer Policy Committee, concluding that there would be savings if combination and rationalisation were enforced.

The combination of Administrative Units in this option could involve the State Computer Centre, the Supply & Tender Department, the Government PABXs, the Government Printer and the messenger services in the major population centres, amongst others. A Department of Administrative Services formed in this way could produce major cost savings and integrate related communication and processing services. The Department could produce one side of

the investment offset pattern with the Tasmanian Development Authority remaining intact to encourage industry through the offsets gained by the DAS.

A less attractive option is to establish an Information Technology Policy Unit which would have the role of advising Government on policies to develop information technology in the Service and to encourage rationalisation and development in strategic areas. However, such a policy unit, although relatively easy to establish, would have little authority, being only advisory, and have no control over the financial outlays made by the relatively autonomous Agencies. This option is, however, the closest to the Cartland model of letting the managers manage with guidance from the Government and periodic review of their effectiveness.

Whichever option proves to be most attractive to Government, it is clear from the results of this analysis that there are inadequacies in management development in relation to computing which must be corrected if the risks produced by the reliance on and expectations of computing in the State Service are to be minimised. Annual reviews of this nature ought to be carried out to enable pre-emptive action to be taken on a Service-wide basis or else crisis management of this most important administrative tool will continue in many Agencies to the detriment of the Service as a whole.

Such an annual review would also be of assistance to the private sector if a summary of results and trends were to be published as part of a Government statement or policy paper on information technology in Tasmania.

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REGISTER OF APPLICATIONS WHICH USE EDP RESOURCES

TASMANIAN GOVERNMENT EDP
STRATEGIC PLANNING FORM 1

GOVERNMENT AGENCY: _____

Name and brief description of the application or system of applications.	Software Source *	Status * *	Year of Completion	Operational Environment			Contact Officer	Phone No.
				Hardware	Operating System	Language		

* Software Source: PR - Proprietary
NP - Non proprietary

* * Status: C - Current System
D - System under development
P - Proposed system.

HARDWARE FACILITIES REGISTER

GOVERNMENT AGENCY: _____

Location and year of installation	Central Processing * Unit		Peripheral Equipment *				Total Purchase Cost or Annual Rental	Total Annual Mtce. Cost.	Main Applications Processed on Computer
	Make and Model	Memory Size KB	Type of Equip.	Make and Model	Qty.	Disc. Drives (Size M/Bytes)			

* See notes (Section 5.2)

TASMANIAN GOVERNMENT EDP
STRATEGIC PLANNING FORM 3.1

Year 1986/87
Year 1987/88
Year 1988/89

COMMUNICATION FACILITIES REGISTER

GOVERNMENT AGENCY: _____

Device type	Device Location	Line Speed	Transmission Mode		Connection Mode		User Termination Device	Host Computer		Device Rental $	Line Rental $
			async	sync	dial-up	non dial-up		Type	Location		

EDP STAFFING

GOVERNMENT AGENCY: _____

Position	Salary	Rate *	State Service					External				
			Number per Year					Days per Year				
			CY-1	CY	CY+1	CY+2	CY+3	CY-1	CY	CY+1	CY+2	CY+3
	Costs (000)	$										

* Rate - daily rate for external or contract staffing.

TASMANIAN GOVERNMENT EDP
STRATEGIC PLANNING FORM 4.2

CURRENT EDP SYSTEMS USERS

GOVERNMENT AGENCY: _____

Year: 1986/87
1987/88
1988/89

APPLICATION OR SYSTEM NAME	Number of Non-EDP Staff using System x hours/day									CATEGORIES OF STAFF WHO ARE OR WILL BE MAIN USERS
	< 1 HOUR	1-2 HOUR	2-3 HOUR	3-4 HOUR	4-5 HOUR	5-6 HOUR	6-7 HOUR			

TASMANIAN GOVERNMENT EDP
STRATEGIC PLANNING FORM 5

GOVERNMENT AGENCY: _____

TRAINING

Course	Trainer's Name, Title, Organisation	Trainee Days per Year					Current Value Cost $				
		1985/6	1986/7	1987/8	1988/9	1989/90	1985/6	1986/7	1987/8	1988/9	1989/0
	Total Days						////////	////////	////////	////////	////////
	Costs (000) $	////////	////////	////////	////////	////////					

TASMANIAN GOVERNMENT

EDP STRATEGIC PLANNING

FINANCIAL SUMMARY

GOVERNMENT AGENCY: _____

	1986/87		1987/88		1988/89	
	$000	$000	$000	$000	$000	$000
6.0 EDP SPECIALIST SALARIES						
. Management						
. Analysis						
. Programmers						
. Operators						
. Data Preparation						
. Other (MAPPER)						
Total Salary						
6.1 IN HOUSE COMPUTING EQUIPMENT						
. Hardware:						
- Purchase						
- Lease P/A						
- Rental P/A						
- Mtce P/A						
Total Hardware						
. Terminals:						
- Purchase						
- Lease P/A						
- Rental P/A						
- Mtce P/A						
Total Terminals						
. Concentrator/Multiplexer Devices:						
- Purchase						
- Lease P/A						
- Rental P/A						
- Mtce P/A						
Total Concentrators						

TASMANIAN GOVERNMENT

EDP STRATEGIC PLANNING

FINANCIAL SUMMARY

GOVERNMENT AGENCY: _____

	1986/87		1987/88		1988/89	
	$000	$000	$000	$000	$000	$000
Off-line Data Preparation Equipment:						
- Purchase						
- Lease						
- Rental P/A						
- Mtce P/A						
Total Data Prep. Equipment						
Auxiliary Equipment:						
- Purchase						
- Lease P/A						
- Rental P/A						
- Mtce P/A						
Total Auxiliary Equipment:						
TOTAL COMPUTING EQUIPMENT: EQUIPMENT						
6.2 SOFTWARE						
. System Software						
. Application packages						
Total Software						
6.3 DATA COMMUNICATIONS						
. Telecom Rental Charges - Modems						
. Telecom Rental Charges - Lines						
. Telex use for Data Communications						
TOTAL DATA COMMUNICATIONS						
6.4 EXTERNAL COMPUTER USAGE						
. Computer Processing						
- Public Sector Bureau						
- Private Bureau						
TOTAL COMPUTER PROCESSING						

TASMANIAN GOVERNMENT

EDP STRATEGIC PLANNING

FINANCIAL SUMMARY

GOVERNMENT AGENCY: _____

	1986/87		1987/88		1988/89	
	$000	$000	$000	$000	$000	$000
. Data Preparation						
- Public Sector Bureau						
- Private Bureau						
Total Data Preparation						
. Other Equipment Services						
- Public Sector Bureau						
- Private Bureau						
Total Equipment Services						
. C.O.M. Services						
TOTAL EXTERNAL COMPUTER USAGE						
6.5 CONSULTANTS AND CONTRACT STAFF:						
. Management Consulting Services						
- Public Sector						
- Private Sector						
Total Consulting Services						
. Systems Design Services						
- Public Sector						
- Private Sector						
Total Design						
. Programming Services						
- Public Sector						
- Private Sector						
Total Programming Service						
. Other Consulting Service						
- Public Sector						
- Private Sector						
Total Other Services						
Total Consultants and Contract Staff						

TASMANIAN GOVERNMENT

EDP STRATEGIC PLANNING

FINANCIAL SUMMARY

GOVERNMENT AGENCY: _____

	1986/87		1987/88		1988/89	
	$000	$000	$000	$000	$000	$000
6.6 OTHER OPERATIONAL COSTS		.....		.....		.....
. EDP Consumables		.....		.....		.....
. System Methodologies		.....		.....		.....
. Other Costs		.....		.....		.....
TOTAL OTHER OPERATIONAL COSTS	.....		.....		.....	
TOTAL ESTIMATED EDP EXPENDITURE	.....		.....		.....	